



It's a Gas!

Three Activities for Exploring Greenhouse Gases

Greenhouse gases are heat-trapping gases, like carbon dioxide and methane. Burning fossil fuels to generate energy produces too many greenhouse gases. This is causing **Global Climate Change** (see pages 5 and 6). Here are some simple activities that help explain greenhouse gases.



A Heavy Topic: Carbon Dioxide Has Weight

Concept: Carbon dioxide (CO_2) has weight, and temperature and pressure have an effect on CO_2 . **Method:**

1. Heat 100 ml of water to 50 degrees Celsius in a 500 ml beaker.
2. Use a balance to find and record the masses of 2 unopened cans of chilled soda. (Note: wipe off any condensation on the outside of the can first.)
3. Open both cans. Have a discussion about what causes the familiar "psstst" sound when a can of soda is opened. (*Carbonated drinks are bottled under pressure, so the pressure in the can is higher than the pressure in the air outside the can. When the can is opened, the pressure inside the can drops until it is equal to the pressure outside. As the pressure drops, CO_2 , a gas, begins to come out of the liquid and escape from the can.*)
4. Wait 3 minutes to allow some of the gas to escape from the cans.
5. Place one of the cans in the warm water. After 10-12 minutes, remove the can from the water and dry it off. Also wipe any condensation from can 2.
6. Using thermometers, measure and record the temperature of each soda. Weigh both cans again and record their masses. Compare the mass before and after to determine the weight of the CO_2 that has escaped from each can. Which can weighs more? Why?

Did You Know....One kilowatt hour (kWh) of

electricity produces about 1.1 pounds of CO_2 ? According to Energy Federation, Inc., MEEP's light bulb supplier, a 20 watt compact fluorescent light bulb (equal to a 75 watt incandescent light bulb) saves 550 kWh over its lifetime. That means you prevent 605

pounds of carbon dioxide from being released into the atmosphere when you replace one incandescent with a compact fluorescent!



Earth in Your Hands: The Greenhouse Effect in a Jar

Concept: The Earth's atmosphere is like a greenhouse.

Method:

1. Using rubber bands, attach 2 pieces of cardboard to the top of 2 thermometers so that the numbers are facing out and use the cardboard to prop the thermometers up.
2. Place one thermometer inside a mayonnaise jar and put the lid on the jar.
3. Place the jar in a sunny window and put the other thermometer next to it (not in a jar). Make sure both are shaded from direct sunlight by the cardboard.
4. Record the temperatures of both thermometers every ten minutes for one hour.

Why does the thermometer in the jar show a higher temperature? (*The glass and lid trap heat from the sun inside the jar, so the air inside the jar gets warmer than the air outside the jar.*) How is the jar like the greenhouse gases in the Earth's atmosphere. How is it different?



Fizzy Logic: Carbon Dioxide and the Greenhouse Effect

Concept: The warming effect of increased CO_2 levels in the atmosphere.

Method:

1. Take 2 cans of soda. Open 1 can the night before the experiment and leave out overnight or until it is flat. Do not open the 2nd can until right before the experiment. Both cans should be at room temperature.
2. Cut the tops off 2 two-liter bottles. Use a ruler to mark a fill line about 3.5 inches up from the bottom on both bottles. Punch a small hole about 2 inches above the fill lines.
3. Fill one bottle to the fill line with fizzy soda and one to the fill line with flat soda. Let the bottles stand for 30-60 min. to let the CO_2 fill the air in the bottle. Test for CO_2 by lowering a lit match into the air in the bottle. If it goes out, there is enough CO_2 to start.
5. Insert thermometers into the holes on the sides of the bottles so the ends are in the middle of the bottles.
6. Place the bottles under a 150 watt spotlight. Record the starting temperatures. Turn on the light and measure the temperature every min. for 10 min. What happens? Why?